ISSN (print) 0093-4666 © 2015. Mycotaxon, Ltd. ISSN (online) 2154-8889

MYCOTAXON

http://dx.doi.org/10.5248/130.689

Volume 130, pp. 689–693 *July–September 2015*

A new species and new records of the lichen genus *Pertusaria* from China

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Abstract — *Pertusaria alticola* sp. nov. is described and illustrated from the Qingzang Plateau in Southwestern China; it is characterized by an isidiate thallus with fertile verrucae, 8-spored asci with uniseriate, ellipsoid ascospores, and the presence of psoromic acid. Three other species, *Pertusaria borealis*, *P. leucosora*, and *P. leucosorodes*, are reported from China for the first time.

Key words — *Pertusariaceae*, lichenized fungi, taxonomy

Introduction

Pertusaria is a genus of crustose lichens with a high biodiversity; diagnostic characters for identifying species are the apothecial structure, number of ascospores per ascus, spore structure, and chemistry (Dibben 1980, Archer 1997, Schmitt & Lumbsch 2004). Since the publication of an annotated key to the lichen genus *Pertusaria* in China (Zhao et al. 2004), additional specimens have been collected and studied. During the survey of Chinese *Pertusaria* species, the author has encountered a new species and, in addition, three *Pertusaria* species are reported here for the first time from China.

Materials & methods

The present study is based mainly on collections preserved in the herbarium, Shandong Normal University, Jinan, China (SDNU) and some specimens in the Lichen Section of Herbarium, Institute of Microbiology, CAS, Beijing, China (HMAS-L). The morphology and anatomy of all specimens were studied using an Olympus SZX16 stereomicroscope and an Olympus BX61 compound microscope and photographed using an attached Olympus DP72 digital camera. Color reactions (spot tests) and the chemical constituents were identified using standard methods (Orange et al. 2001).

Taxonomy

The new species

Pertusaria alticola Q. Ren, **sp. nov.** PLATE 1

MycoBank MB811504

Differs from *Pertusaria wulingensis* by its isidiate thallus and smaller ascospores.

TYPE: China, Yunnan, Yulong County, Lijiang Alpine Botanical Garden, alt. 3590 m, on *Pinus densata* Mast., 16 Aug. 2011, Ren 2011180 (**holotype**, SDNU).

ETYMOLOGY: from the Latin *altus*, high and *cola*, dweller, a reference to the high altitudes at which the specimens were collected.

THALLUS gray or ash-gray, thin, the margin entire and unzoned; SURFACE smooth, generally matt, continuous; SOREDIA absent, but ISIDIA present and generally prolific, papillate or granulate, rarely coralloid-branched, and fragile, 0.1–0.3 mm wide and 0.1–0.5 mm tall, concolorous with thallus. FERTILE VERRUCAE uncommon, lecanorate, well dispersed, rarely fused, concolorous with the thallus, borne between isidia, 0.5–1.0(–1.5) mm in diam. DISCS yellowish, level and lightly pruinose when mature. APOTHECIA 1 or 2–3 per verruca, the fruit center hyaline. HYPOTHECIUM hyaline or brownish, EPITHECIUM brownish, K–. ASCI 8-spored, cylindric; ASCOSPORES strictly uniseriate, hyaline, ellipsoid or round, 12–20 × 10–12 μm; SPORE WALL smooth, thin, c. 1–2 μm thick and the end wall not trimmed; PYCNIDIA not seen.

CHEMISTRY — Cortex K–, C–, KC–, Pd–; medulla K+ yellow, C–, KC–, Pd+ yellow. TLC: psoromic acid.

ECOLOGY & DISTRIBUTION — *Pertusaria alticola* is an isidiate corticolous species, found at several localities on the Qingzang Plateau. This new species grows mainly on bark of conifers, especially *Pinus* and *Picea*, at altitudes between 2450 m and 4100 m.

ADDITIONAL SPECIMENS EXAMINED — **CHINA**. **YUNNAN**: Yulong County, Lijiang Alpine Botanical Garden, on *Pinus densata*, alt. 3460 m, 2011, Ren 2011448 (SDNU); alt. 3590 m, 16 Aug. 2011, Ren 2011179 (HMAS-L). **XIZANG**: Linzhi County, Mt. Sejilashan, alt. 3300 m, on bark, 2007, Han 20073032 (SDNU). **GANSU**: Wenxian County, Qiujiaba, on bark, alt. 2450 m, 2007, Yang 20070021, 20070048 (SDNU); alt. 2940 m, 2007, Yang 20070056 (SDNU); Zhouqu County, Huacaopo, alt. 3400 m, on *Picea*, 2006, Shi 061058 (SDNU).

COMMENTS — *Pertusaria alticola* is chemically identical to *P. wulingensis* Z.T. Zhao & Z.S. Sun, which differs by its larger ascospores (27–40 μm long), pink discs, and lack of isidia (Ren et al. 2009). *Pertusaria alticola* also has the same chemistry as *P. wauensis* Elix & A.W. Archer, a sterile species that differs by its generally wider, more irregularly shaped isidia, and which is known only from Papua New Guinea, Sarawak, and Australia (Elix et al. 1997).

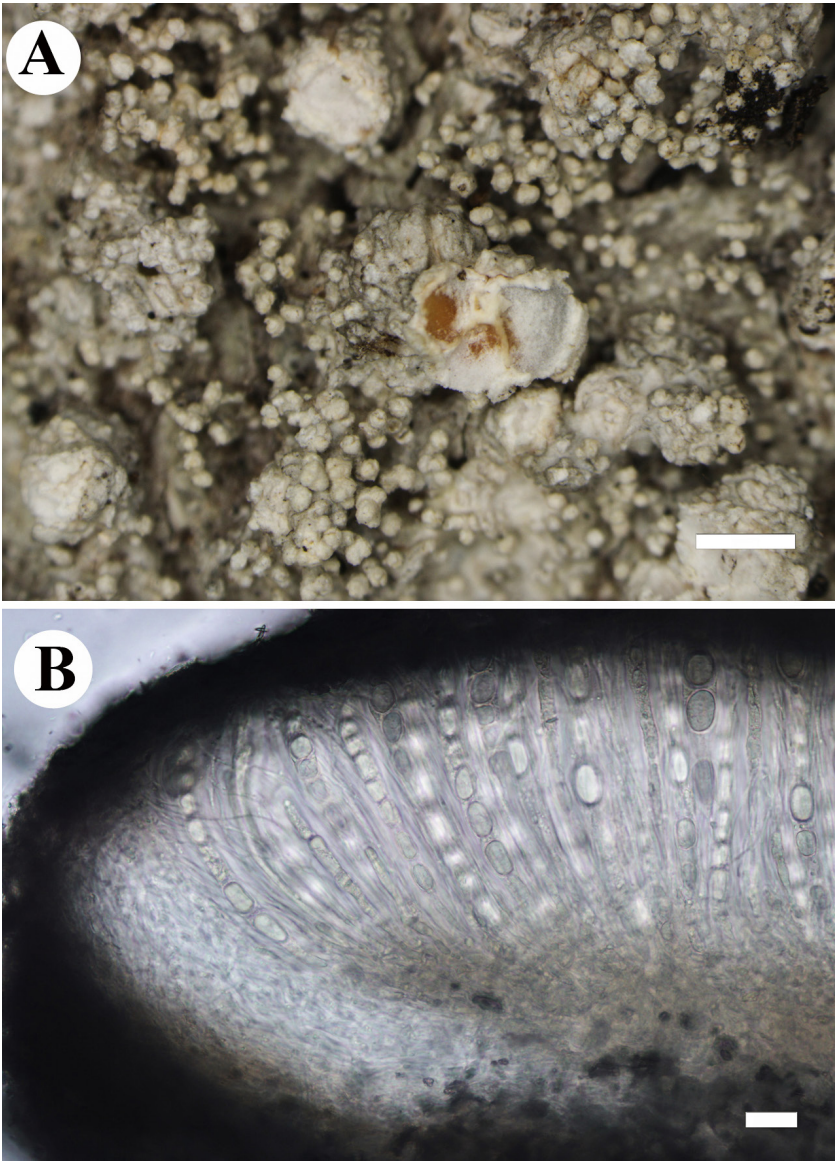

Plate 1. *Pertusaria alticola* (Ren 2011180, SDNU).
A. thallus; B. Apothecium cross section. Scale bars: A = 1 mm; B = 20 μm.

New records for China

Pertusaria borealis Erichsen, Ann. Mycol. 36: 354 (1938).

This species is characterized by a corticolous thallus with white soralia and the presence of fumarprotocetraric and protocetraric acids. It grows mainly on old bark of pine trees (*Pinus*), and sometimes on deciduous tree bark (*Quercus* and *Betula*) in China, and has a temperate distribution in Europe (Smith et al. 2009) and North America (Dibben 1980). This is a new record for China.

Specimens examined — **China**. **Yunnan:** Chuxiong City, Mt. Zixishan, alt. 2460 m, on *Pinus armandii* Franch., 2011, Ren 2011337 (HMAS-L), 2011346, 2011360 (SDNU); Yulong County, Mt. Laojunshan, alt. 3075 m, on bark, 2002, Ren 14 (HMAS-L 091314); Yulong Snow Mountain, near Yufeng Temple, alt. 2800 m, on *Pinus* sp., 2002, Ren 124 (SDNU); Lijiang Alpine Botanical Garden, alt. 3590 m, on *Quercus pannosa* Hand.-Mazz., 2011, Ren 2011397 (SDNU); Jianchuan County, Mt. Shibaoshan, alt. 2640 m, on *Quercus acutissima* Carruth., 2011, Ren 2011264 (SDNU). **Xizang:** Linzhi County, Lulang Town, Sejilashan Observatory Station, alt. 3300 m, on bole of *Betula*, 2001, Han 20073067 (SDNU); the east slope of Mt. Sejilashan, alt. 4100 m, on bark, 2007, Han 20073250 (SDNU).

Note — Morphologically, *Pertusaria borealis* resembles *P. amara* (Ach.) Nyl., which differs by having KC+ violet soralia and containing picrolichenic acid.

Pertusaria leucosora Nyl., Flora 60: 223 (1877).

This rare, saxicolous species is characterized mainly by a thick, cracked, areolate thallus with a zoned margin; hemispherical white soralia (0.8–1.5 mm in diam.); and the production of protocetraric acid. It is reported from Europe (Smith et al. 2009), Japan (Oshio 1968), India (Awasthi 1991), and Iran (Valadbeigi & Sipman 2010). This is a new record for China.

Specimens examined — **China**. **Shaanxi**: Mt. Taibai, on the roadside between Yingtou Police Station and Shangbaiyun, alt. 1150 m, on rock, 2005, Wang & Yang TBW377 (SDNU). **Yunnan**: Luquan County, Jiaozi Snow Mountain, alt. 3800 m, on rock, 2008, Wang 20082256, 20081172, 20082298 (SDNU), Sun 20082162, 20082377 (SDNU).

Note — In ecology and morphology, *P. leucosora* can be confused with the European *Pertusaria aspergilla* (Ach.) J.R. Laundon, but *P. aspergilla* contains fumarprotocetraric acid and has isidia and pale yellow-whitish soralia (Smith et al. 2009).

Pertusaria leucosorodes Nyl., Acta Soc. Sci. Fenn. 26(10): 16 (1900).

= *Pertusaria scaberula* A.W. Archer, Mycotaxon 41: 240 (1991).

This sterile species is characterized by a thallus with abundant disciform soralia and the presence of thamnolic acid and lichexanthone (cortex K+ yellow, UV+ orange, medulla K+ vivid yellow, Pd+ yellow). This corticolous species occurs in Sri Lanka, Australia, Papua New Guinea, and Norfolk Is.

(Archer 1997, as *Pertusaria scaberula*) and India (Shyam et al. 2011). This is a new record for China.

Specimens examined — **CHINA**. **Fujian:** Wuyishan City, Dawangfeng, alt. 540 m, on bark, 2013, Ren 2012576 (SDNU); Jian'ou City, Wanmulin, alt. 370 m, on bark, 2007, Jia 20073478 (SDNU); Longyan City, Huanglianyu, alt. 1400 m, on bark, 2010, Jiang 20105510 (SDNU). **Yunnan**: Shilin County, near Shilin Scenic Area, alt. 1909 m, on bark, 2002, Ren 316 (HMAS-L); Menghai County, Mangao Nature Reserve Area, alt. 1350 m, on *Quercus*, 2011, Ren 2011811 (SDNU). **Guangdong**: Xinyi City, Datianding, alt. 1700 m, on bark, 2010, Wang 20107049 (SDNU); Fengkai County, Heishiding Shan, alt. 220 m, on dead branch, 1998, Guo 2193 (HMAS-L). **Jiangxi**: Mt. Lushan, Sanbaoshu, alt. 890 m, 2008, Zhao 20090129 (SDNU). **Hainan**: Ledong County, Jianfengling, alt. 900 m, on bark, 2007, Meng M314 (HMAS-L).

Acknowledgements

The author thanks Drs. Alan W. Archer (National Herbarium of New South Wales, Australia) and André Aptroot (ABL Herbarium, Soest, The Netherlands) for presubmission review. This project is supported by the National Natural Science Foundation of China (31100011), and the Excellent Young Scholars Research Fund of Shandong Normal University. The author is grateful to Ms. Hong Deng (HMAS-L) for loan of specimens during the study.

Literature cited

Archer AW. 1997. The lichen genus *Pertusaria* in Australia. Bibliotheca Lichenologica 69. 249 p.

Awasthi DD. 1991. A key to the microlichens of India, Nepal and Sri Lanka. Bibliotheca Lichenologica, 40. 332 p.

Dibben MJ. 1980. The chemosystematics of the lichen genus *Pertusaria* in North America north of Mexico. Publications in Biology and Geology, Milwaukee Public Museum 5. 162 p.

Elix JA, Aptroot A, Archer AW. 1997. The lichen genus *Pertusaria* (lichenized *Ascomycotina*) in Papua New Guinea & Australasia: twelve new species and thirteen new reports. Mycotaxon 64: 17–35.

Orange A, James PW, White FJ. 2001. Microchemical methods for the identification of lichens. London: British Lichen Society.

Oshio M. 1968. Taxonomical studies on the family *Pertusariaceae* of Japan. Journal of Science of the Hiroshima University, Series B, Div. 2 (Botany) 12: 81–151.

Ren Q, Sun ZS, Zhao ZT. 2009. *Pertusaria wulingensis* (*Pertusariaceae*), a new lichen from China. Bryologist 112(2): 394–396. http://dx.doi.org/10.1639/0007-2745-112.2.394

Schmitt I, Lumbsch HT. 2004. Molecular phylogeny of the Pertusariaceae supports secondary chemistry as an important systematic character set in lichen-forming ascomycetes. Molecular Phylogenetics and Evolution 33: 43–55. http://dx.doi.org/10.1016/j.ympev.2004.04.014

Shyam KR, Thajuddin N, Upreti DK. 2011. Diversity of lichens in Kollihills of Tamil Nadu, India. International Journal of Biodiversity and Conservation 3(2): 36–39.

Smith CW, Aptroot A, Coppins BJ, Fletcher A, Gilbert OL, James PW, Wolseley PA (eds). 2009. The lichens of Great Britain and Ireland. Second edition. London: British Lichen Society.

Valadbeigi T, Sipman HJM. 2010. New records of lichens and lichenicolous fungi from Iran and their biogeographical significance. Mycotaxon 113: 191–194. http://dx.doi.org/10.5248/113.191

Zhao ZT, Ren Q, Aptroot A. 2004. An annotated key to the lichen genus *Pertusaria* in China. Bryologist 107(4): 531–541.
http://dx.doi.org/10.1639/0007-2745(2004)107[531:AAKTTL]2.0.CO;2